

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claim 1 (withdrawn): An improved cartridge primer having a quantity of inorganic reactive material therein for producing a limited-life thereof.

Claim 2 (withdrawn): The improved cartridge primer of Claim 1, wherein said inorganic reactive material is in the form of a multilayer material.

Claim 3 (withdrawn): The improved cartridge primer of Claim 1, wherein said inorganic reactive material is in the form of a powder.

Claim 4 (withdrawn): The improved cartridge primer of Claim 3, wherein said powder is formed from a multilayer material.

Claim 5 (withdrawn): The improved cartridge primer of Claim 1, wherein said inorganic reactive material is in the form of a multilayer material pre-form including a foil base.

Claim 6 (withdrawn): The improved cartridge primer of Claim 2, wherein the limited-life is accomplished by an explosive containing said inorganic reactive materials which are

constructed to produce time-dependent interdiffusion of the composition of the inorganic materials.

Claim 7 (withdrawn): The improved cartridge primer of Claim 2, wherein the limited life is accomplished by an addition of a quantity of material that has a change at low temperature selected from the group consisting of a destructive phase change, a thermal contraction change, and an internal stress change.

Claim 8 (withdrawn): The improved cartridge primer of Claim 1, wherein an extension of the limited-life by storing at low temperature is prevented by an addition of material that has a destructive phase change at low temperatures.

Claim 9 (withdrawn): The improved cartridge primer of Claim 1, wherein an extension of the limited-life by storing at low temperature is prevented by an addition of material that has a destructive thermal contraction change at low temperatures.

Claim 10 (withdrawn): The improved cartridge primer of Claim 1, wherein an extension of the limited-life by storing at low temperature is prevented by an addition of material that has a destructive internal stress change at low temperature.

Claim 11 (withdrawn): An ammunition consisting of a cartridge case, cartridge primer, propellant, and projectile, the improvement comprising:

said cartridge primer being a limited-life cartridge primer constructed of inorganic reactive materials.

Claim 12 (withdrawn): The improved cartridge primer of Claim 11, wherein said inorganic reactive materials are selected from the group consisting of: two material multilayers and three material multilayers.

Claim 13 (withdrawn): The improved cartridge primer of Claim 11, additionally including a quantity of material that has at low temperature one of: a destructive phase change, a thermal contraction change, and an internal stress change.

Claim 14 (withdrawn): The improved cartridge primer of Claim 12, wherein said inorganic reactive materials are composed of two material multilayers having alternating layers.

Claim 15 (withdrawn): The improved cartridge primer of Claim 14, wherein said alternating layers are selected from the group consisting of Ti-B, Zr-B, Ta-B, Nb-B, B-C, Al-C, Hf-C, Ti-C, Ta-C, Si-C, Ni-Al, Ti-Al, Li-B, Li-Al, and Ni-Ti.

Claim 16 (withdrawn): The improved cartridge primer of Claim 13, wherein said quantity of material is composed of tin.

Claim 17 (currently amended): A process for producing limited-time cartridge primers, including:

forming an explosive for a cartridge primer from a quantity of inorganic reactive material ~~having~~ by:

selecting at least two materials for said inorganic reactive material, said at least two materials of a type characterized by time-dependent interdiffusion of elements therebetween which reduces stored energy and reactivity in a metastable reactive interface thereof without producing a passivation layer; and

contacting said at least two materials with each other in an arrangement adapted to realize no more than a desired shelf life based on said known time-dependent interdiffusion characteristics of the selected at least two materials, thereby producing a limited-life of the explosive.

Claim 18 (original): The process of Claim 17, additionally including providing a quantity of tin in the inorganic reactive material.

Claim 19 (currently amended): The process of Claim 17, wherein forming the explosive from a quantity of inorganic reactive material is carried out by ~~forming~~ depositing said at least two materials in a multilayer of the inorganic reactive material arrangement.

Claim 20 (currently amended): The process of Claim 19, wherein forming the multilayer arrangement is carried out by forming alternating layers of ~~inorganic reactive material~~ the at least two materials wherein the interdiffusion of elements occurs at the metastable reactive interfaces of the multilayer material thereof.

Claim 21 (original): The process of Claim 17, wherein the inorganic reactive material is formed as a powder.

Claim 22 (currently amended): The process of Claim 21, wherein the powder is produced by contacting said at least two materials to forming form a highly stressed multilayer of ~~inorganic reacting elements that disintegrate~~ and disintegrating the stressed multilayer into a powder.

Claim 23 (currently amended): The process of Claim 17, wherein forming the explosive of the inorganic reactive material is carried out by forming the inorganic reactive material on a foil, and then cutting quantities of selected sizes from the foil and the inorganic reactive material.

Claim 24 (original): The process of Claim 23, additionally including forming a film of tin on the foil before cutting into selected sizes.

Claim 25 (original): The process of Claim 17, additionally including depositing the inorganic reactive material in multilayers on a foil composed of materials selected from the group consisting of aluminum, nickel, and copper.

Claim 26 (original): The process of Claim ~~17~~ 19, wherein the inorganic reactive material is deposited in multilayers of three different materials.

Claim 27 (original): The process of Claim ~~17~~ 19, wherein the inorganic reactive material is deposited in a multilayer of alternating layers of two different materials.

Claims 28 and 29 (cancelled)

Claim 30 (withdrawn): An ammunition including a primary initiator having a limited functional life-time.

Claim 31 (withdrawn): The ammunition of Claim 30, wherein said primary initiator includes inorganic reactive material.

Claim 32 (withdrawn): The ammunition of Claim 30, wherein said primary initiator additionally includes a quantity of tin.

Claim 33 (withdrawn): The ammunition of Claim 30, wherein said primary initiator includes a material having changes at low temperature selected from the group consisting of a destructive phase change, a thermal contraction change, and a internal stress change.

Claim 34 (withdrawn): The ammunition of Claim 33, wherein said material is composed of pure tin.

Claim 35 (withdrawn): The ammunition of Claim 31, wherein said inorganic reactive material is composed of a reactive material multilayer selected from the group consisting of two materials and three materials.

Claim 36 (withdrawn): The ammunition of Claim 35, wherein said reactive material multilayer is composed of alternating layers of two materials, selected from the group consisting of Ti-B, Zr-B, Ta-B, Nb-B, Al-C, Ti-C, Hf-C, Ta-C, Si-C, Ni-Al, Li-B, Li-Al, and Ni-Ti.

Claim 37 (withdrawn): The ammunition of Claim 35, wherein said alternating layers are deposited on a foil composed of materials selected from the group of aluminum, nickel, and copper.

Claim 38 (withdrawn): The ammunition of Claim 37, wherein said foil containing said deposited alternating layers is converted to pre-forms containing sections of said foil and said deposited alternating layers of reactive materials.

Claim 39 (withdrawn): The ammunition of Claim 35, wherein said multilayer is highly stressed so as to disintegrate to a powder of inorganic reactive material.

Claim 40 (withdrawn): The ammunition of Claim 35, wherein said reactive material multilayer is composed of layers of three materials, selected from the group consisting of Ti-Al-CuO, Ti-C-CuO, Be-C-CuO, and Al-C-CuO.

Claim 41 (withdrawn): The ammunition of Claim 40, wherein said multilayer is converted to a powder of reactive material.

Claim 42 (withdrawn): The ammunition of Claim 30, wherein said primary initiator is activated electrically.

Claim 43 (withdrawn): The ammunition of Claim 30, wherein said primary initiator includes a quantity of a chemical explosive and an inorganic reactive multilayer material.

Claim 44 (withdrawn): The ammunition of Claim 31, wherein said primary initiator additionally includes a quantity of pure tin.

Claim 45 (withdrawn): The ammunition of Claim 30, wherein said primary initiator comprises: a first cup-like member, a second cup-like member, said first and second cup-like members being positioned in inverted relationship, an insulator positioned intermediate adjacent wall sections of said cup-like members, one of said cup-like members containing a quantity of chemical explosive material, and an inorganic reactive multilayer located adjacent a bottom section of another of said cup-like members.

Claim 46 (withdrawn): The ammunition of Claim 38, wherein said primer initiator additionally includes a quantity of tin in one of said cup-like members.

Claim 47 (withdrawn): A detonator for explosives including a primary initiator charge having a limited functional life-time.

Claim 48 (withdrawn): The detonator of Claim 47, wherein said primary initiator includes a reactive material multilayer selected from the group consisting of two elements and three elements.

Claim 49 (withdrawn): The detonator of Claim 48, additionally including means for activating said primary initiator electrically.

Claim 50 (withdrawn): The detonator of Claim 49, additionally including a quantity of chemical explosive.

Claim 51 (withdrawn): The detonator of Claim 47, additionally including a quantity of tin.

Claim 52 (withdrawn): The detonator of Claim 47, wherein extension of the limited function life-time by storing at low temperatures is prevented by the addition of a quantity of material that has changes therein at low temperature including at least one of: a destructive phase change, a thermal contraction change, and an internal stress change.

Claim 53 (withdrawn): The improved cartridge primer of Claim 2, wherein said organic reactive material is activated electrically.

Claim 54 (original): The process of Claim 19, wherein forming a multilayer of the inorganic reactive material is carried out by depositing alternating layers of material selected from the group consisting of Ti-B, Zr-B, Ta-B, Nb-B, B-C, AL-C, Hf-C, Ti-C, Ta-C, Si-C, Ni-Al, Ti-Al, Li-B, Li-Al, and Ni-Ti.

Claim 55 (original): The process of Claim 54, wherein the depositing of the alternate layers of material is carried out by magnetron sputtering.

Claim 56 (currently amended): The process of Claim 17, additionally including forming a multilayer of the inorganic reactive material which is carried out by depositing layers of three materials selected from the group consisting of Ti-Al-CuO, Ti-C-CuO, Be-C-CuO, and Al-C-CuO.

Claim 57 (original): The process of Claim 56, wherein the depositing of the inorganic reactive material is carried out by magnetron sputtering.

Claim 58 (currently amended): The process of Claim 17, additionally including forming a multilayer of the inorganic reactive material which is carried out by depositing sequential layers of Ti, C, CuO, Cu, Ti, C, CuO, Cu, etc.

Claim 59 (currently amended): The process of Claim 17 additionally including forming a multilayer of the inorganic reactive ~~materials~~ material which is carried by depositing a multilayer structure having metal-carbon-oxide combinations.

Claim 60 (original): The process of Claim 59, wherein the metal-carbon-oxide combinations are selected from the group consisting of Al-C-CuO, Be-C-CuO, and Ti-Al-CuO.

Claim 61 (original): The process of Claim 17, additionally includes forming a layer of tin, and then forming the multilayer of the inorganic reactive material on the layer of tin.

Claim 62 (original): The process of Claim 61, wherein the multilayer of inorganic reactive material is composed of alternating layers of Ti and B.

Claim 63 (original): The process of Claim 61, wherein the layer of tin is formed in cup portion of a primer assembly, and the multilayer is formed on the layer of tin.

Claim 64 (currently amended): A process for producing limited-time cartridge primers, consisting essentially of:

forming a layer of tin, and

forming an explosive on the layer of tin ~~composed of a multilayer of~~ by contacting alternating layers of Ti and B with each other in a multilayer arrangement adapted to realize no more than a desired shelf life based on predetermined time-dependent interdiffusion characteristics between Ti and B, which reduces stored energy and reactivity in a metastable reactive interface thereof without producing a passivation layer, to form a limited-time cartridge primer.

Claim 65 (original): The process of Claim 64, wherein forming the explosive on the layer of tin is carried out by depositing a powder formed from alternating layers of Ti and B.

Claim 66 (original): The process of Claim 65, wherein depositing the alternating layers of Ti and B is carried out by magnetron sputtering.

Claim 67 (original): The process of Claim 64, additionally including forming the layer of tin in a cup portion of a primer assembly.

Claim 68 (withdrawn): In a process for forming a Boxer type cartridge primer including a cup, and explosive mixture, a foil, and an anvil, the improvement comprising:

utilizing an inorganic reactive multilayer material as at least a portion of the explosive mixture.

Claim 69 (withdrawn): The improvement of Claim 68, additionally including eliminating the foil.

Claim 70 (withdrawn): The improvement of Claim 68, additionally including utilizing the inorganic reactive multilayer material in a powder form as the explosive mixture.

Claim 71 (withdrawn): The improvement of Claim 68, additionally including providing the cup with a quantity of tin.

Claim 72 (withdrawn): The improvement of Claim 68, additionally including providing the inorganic reactive multilayer material in the form of multilayers and multilayer powder as the explosive mixture.

Claim 73 (withdrawn): The improvement of Claim 68, additionally including forming the inorganic reactive multilayer material from multilayers selected from the group consisting of three element and two element multilayers.

Claim 74 (withdrawn): The improvement of Claim 68, additionally including providing the cup with a quantity of material that has changes therein at a temperature of about 0 to 50°C including at least one of: a destructive phase change, a thermal contraction change, and an internal stress change.

Claim 75 (withdrawn): The improvement of Claim 68, additionally including forming the inorganic reactive multilayer material from alternating layers of titanium and boron with a layer thickness of each in the range of 1 to 1000 nm.

Claim 76 (withdrawn): The improvement of Claim 68, additionally including forming the inorganic reactive multilayer material so that each multilayer is composed of layers of three materials.

Claim 77 (withdrawn): The improvement of Claim 76, wherein the multilayers of layers of three materials are selected from the group of materials consisting of Ti-Al-CuO, Ti-C-CuO, Be-C-CuO, and Al-C-CuO.

Claim 78 (withdrawn): The improvement of Claim 77, wherein said inorganic reactive multilayer material is converted to a powder of reactive material.

Claim 79 (withdrawn): The improvement of Claim 68, additionally including providing the inorganic reactive multilayer material in the form of multilayers of titanium and boron.

Claim 80 (withdrawn): The improvement of Claim 79, additionally including forming the multilayers of titanium and boron with a layer thickness of 20Å to 100Å each.